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ABSTRACT

The paper describes Project ICE (Institute for Creative Education), an approach to developing students' divergent thinking skills through a creative problem-solving process. Project ICE is designed to help students of all backgrounds and ability levels benefit by growth in fluent, flexible, original, and elaborate responses to problems or tasks. The curriculum is sequentially organized by both grade level and level of difficulty of the lesson or activity. Project materials, including the curriculum for grades K-6 and 7-12, a teacher training manual, administration manual, and parent citizen brochure, are briefly described. Classroom activities involve brainstorming and student analysis of their responses through categorization to clarify their fluency, flexibility, and originality. Classroom implementation requirements, including initial training and followup costs, are noted. A brief note on program evaluation is followed by implementation information about timelines and opportunities to visit Project ICE adoption sites. (CL)

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1. Abstract

Designed for heterogeneously and homogeneously grouped classrooms, the Institute for Creative Education (Project ICE) develops students' divergent thinking skills through a creative problem-solving process. Using the Project ICE curriculum that consists of tasks and problems that are linked to such subject areas as language arts, mathematics, science, social studies, the students learn how to explore alternative solutions. Students of all backgrounds and ability levels benefit from exposure to this process-oriented approach.

The general goal for Project ICE is for the students to show substantial growth in fluent, flexible, original and elaborate responses to problems or tasks. Students also develop self-confidence in their ability to think divergently and to solve problems productively. Other tangential goals seen when involved with the Project ICE process are: (1) students become better decision makers, (2) students learn respect for themselves and one another, and (3) students learn to work in cooperative groups; teachers learn: (1) a different method of facilitating learning, (2) to respect students' thinking abilities, and (3) new methods of teaching "old" or traditional subject matter.

Using both whole classroom and small group settings the Project ICE curriculum shows a great deal of flexibility in use. It is sequentially organized by both grade level and level of difficulty of the lesson or activity. This sequential ordering teaches a creative problem-solving process by starting the students at an entry level (simple brainstorming) then adds new skills at each consecutive level, building on the learned skills mastered at the previous level. The student is aware of each step (s)he progresses through, and works toward a higher level where problems are tied to more academically challenging, futuristic and life-skills problems.

A key area for the lessons or activities is the students' analysis of their ideas or the categorization section of the lesson. All students take part in categorizing the group responses to the task or problem, a thinking process that will reinforce the delineation of many, different and unusual responses. (This corresponds to Torrance and Guilford's definitions of the creative elements --

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fluency, flexibility, originality and elaboration.) This elaboration is understood and developed with each lesson or activity as finished products are designed and/or made to demonstrate the workability of one or more of the solutions to the given problem.

2. Organization and Materials

Each teacher must be trained by the Project ICE staff in the concepts and components of the project before the curriculum is made available. The curriculum was developed for K through 12th grades, with grades 4-6 receiving state and national validation.

Available to the Project ICE trained teachers and an adopting school or district are the following materials:

- Institute for Creative Education Curriculum - Approximately 125 lessons in grades K-6 and approximately 130 lessons in grades 7-12.
- Teacher-Training Manual "Developing Creativity" - Discussion of creativity philosophies, educational theories, training activities and supplementary materials for the trainee.
- Administration Manual - Guide to efficient managing of project implementation for the teacher, the school, and the district.
- Evaluation Manual - Guide to setting up an evaluation design and/or procedure for implementation of the project. The manual includes testing resources available in the area of creative thinking, problem solving, and related areas.
- Parent Citizen Brochure - All you ever wanted to tell your board and interested citizens of the importance for creative problem solving and divergent-thinking skill development in school.

No additional hardware is necessary for implementation besides a few arts and crafts supplies and "recycled junk" for projects.

3. Classroom Activities

Student participation in the Project ICE curriculum activities on a regular basis (at least one 45-minute lesson per week) adds new learning experiences that enhance the students' total learning development.

Lessons or activities have a set format that varies somewhat in the method of idea generation or brainstorming. Each lesson has a teacher introduction (background for the teacher or previous information, technique, etc. students may need) which is followed by a student motivation section ("script" for the teacher to use with the class as an introduction to the lesson). The problem is stated in such a way that many, different, and unusual responses can be elicited during the idea generation period which follows. A time limit is often set on the idea generation section which varies according to the difficulty level of the task or problem to be solved.

The students then analyze their responses through categorization in order to clarify how fluent, flexible, and original they have been. (Project ICE defines originality as a one-of-a-kind response: the one or ones no one else thought of or the one or ones in categories by themselves.) Since the students make all these decisions with the teacher acting as a guide, there is a great deal of flexibility in all of the lessons. There is much room for growth as the students continue to practice and apply decision-making skills in a variety of situations and circumstances. The students then move towards demonstrating solutions to the problems -- individual or group solutions -- in finished products which may be drawn, written, drafted, constructed, role played, simulated, etc.

To measure the students' growth, the student may be pre and post tested with the "Torrance Test of Creative Thinking," or "Williams Creativity Assessment Packet (CAP)," or perhaps several Guilford based tests. Subjective data may also be gathered by teachers, parents and peers. Project ICE suggests that students (as well as teachers) keep a record of their activities and at the end of the school year assess their own progress in learning the creative problem-solving process.

4. Implementation Requirements

There are no special facilities and equipment needed. Any classroom arrangement is conducive to the implementation of Project ICE lessons or activities. The teacher must be trained by the Project staff and the training may take place in school district sites. The size of the training group is negotiated between the project and the adopting district. A two-day training session can accommodate a maximum of thirty (30) teachers and a one full-day (8½ hours) training workshop can accommodate a registration of no more than fifteen (15) teachers. (A two-day training workshop is most effective and preferred by the Project ICE staff.) It is suggested that administrators gain an awareness of the project either through an awareness session or through participation in the first three hours of training.

Project ICE asks the teacher to implement the curriculum according to the prescribed five-step difficulty sequence of lessons (Level I→Level II→etc.); there is flexibility in the choice of lesson within each difficulty level. Simple records need to be kept by the teacher on each lesson taught, and any pre and post data should be shared with Project ICE.

5. Training and Implementation Costs

The following cost schedules are an estimate, based on the initial two-day training workshop of 25 teachers (representing an average 625 student population) and will fluctuate dependent upon a district's specific needs.

INITIAL TRAINING COSTS

Released time for teachers, 25 x $40	$ 1,000.00
1 ICE staff member, consultant fee 2 days @ $200/day	400.00
1 ICE staff member, estimated $550 air fare	550.00*
1 ICE staff member, per diem 3 days @ $85	255.00
Curriculum Costs:	
Curriculum 25 x $40	1,000.00
Training Manual 25 x $15	375.00
Administration Manual	5.00
Evaluation Manual	8.00
Miscellaneous Supplies (Construction paper, etc.)	400.00
	$ 3,993.00**

FOLLOW-UP COSTS+

Follow-up visit by ICE staff (3-day on-site visit)	
1 ICE staff member, consultant fee 3 days @ $200/day	$ 600.00
1 ICE staff member, estimated $550 air/fare	550.00 *
1 ICE staff member, per diem 4 days @ $85	340.00
	$1,490.00

*Or mileage - $.22 per mile plus tolls.

**(For an estimated 625 students, 25 teachers x 25 students, cost per student = $6.39.)

+The Institute strongly recommends the follow-up visitation to insure effective implementation of the ICE strategies and curriculum materials.

PRE-POST TEST COSTS++

"Torrance Test of Creative Thinking" (pre and post testing) 32 pkgs. of 20 tests @ $12.00 = $384 x 2 (Available through Scholastic Testing Service)	$ 768.00
Scoring, $2.25/test x 625 x 2 (pre and post) Scholastic Testing Service, Bensenville, IL	$2,812.50
Analysis - Evaluation Specialist $200/day x 3 days	$ 600.00
	4,180.50 **

All costs are negotiable by Project ICE and adopting school districts. Where other funds are available, total or partial costs may be covered.

6. Program Evaluation

The "Torrance Test of Creative Thinking" (Figural' Form A-pre, Form B-post) was administered to Project ICE students and comparable control students. The "California Test of Mental Maturity" (Short Form) was also administered to all students. The data analysis procedure involved a comparison group controlling for difference in pretest score, IQ and other variables.

It was found that Project ICE students in grades 4-6 significantly improved their creative-thinking abilities in the area of flexibility, originality, and elaboration beyond the .05 significant level. Because of the known creativity slump in the fourth grade*, these advances for project students become important.

++Subject to change by the Scholastic Testing Service.
**(25% random sampling for pre and post testing with comparable control groups would be less expensive.)
*"Torrance Test of Creative Thinking - Norms Manual."

7. Time Line

While optimum implementation indicates training near the beginning of the school year, it is possible to train and implement at any opportune time during the school year provided released time is available to school districts.

	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Training	x	x										
Pretest		x	x									
Establish District ICE Coordinator		x										
Implementation (average of once a week)		x	x	x	x	x	x	x	x	x		
Follow up by ICE staff (at least 1 visit)	x		x	x	x	x	x	x	x	x		
Posttest									x	x		
Data Analysis and Final Report										x	x	x

8. Visitation Opportunities

Project ICE has adoption sites in Alaska, Arkansas, California, Colorado, Connecticut, Hawaii, Idaho, Indiana, Iowa, Maine, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, Ohio, Rhode Island, South Carolina, Texas, Vermont, Virginia and Washington. Demonstration classrooms at sites in these states are available and visitations can be arranged by contacting the Project ICE staff.

9. Other Information

While many districts are using this program as a component of their gifted and talented curriculum, Project ICE believes strongly that all students benefit from involvement in this project. Creative thinking truly brings together all basic skills by teaching another most basic of skills -- problem solving indeed a lifetime skill for all students.

10. Project ICE Contact Persons

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